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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/541,118	Applicant(s) LAURENT ET AL.	
	Examiner MEKONEN BEKELE	Art Unit 2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 March 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-26* is/are pending in the application.

4a) Of the above claim(s) *2 and 4* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3,5-11 and 14-26* is/are rejected.

7)☒ Claim(s) *12 and 13* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *23 June 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *06/30/2005, 06/23/2006,* .
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1, 3 and 5-26 are pending in this application.

Priority

2. Acknowledgement is made of application's claim for foreign priority under 35 U.S.C. 119 (a)-(d) based on the French patent application 02/16929 filed on 12/31/2002. The certified copy has been filed in parent application No. 10/541118, filed on 06/23/2006.

Information Disclosure Statement

3. The information disclosure statements field on 06 /23/2006 and 06/30/2005 are in compliance with the provisions of 37 CFR 1.97, and have been considered and copies are enclosed with this Office Action.

Drawings

4. The Drawings filed on 06/23/2006 are accepted for examination.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

The USPTO "Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility" (Official Gazette notice of 22 November 2005), Annex IV, reads as follows:

> In contrast, a claimed computer-readable medium encoded with a computer program is a computer element which defines structural and functional interrelationships between the computer program and the rest of the computer which permit the computer program's functionality to be realized, and is thus statutory. See Lowry, 32 F.3d at 1583-84, 32 USPQ2d at 1035.

> Claims that recite nothing but the physical characteristics of a form of energy, such as a frequency, voltage, or the strength of a magnetic field, define energy or magnetism, per se, and as such are nonstatutory natural phenomena. O'Reilly, 56 U.S. (15 How.) at 112-14. Moreover, it does not appear that a claim reciting a signal encoded with functional descriptive material falls within any of the categories of patentable subject matter set forth in Sec. 101.
>
> … a signal does not fall within one of the four statutory classes of Sec. 101.
>
> … signal claims are ineligible for patent protection because they do not fall within any of the four statutory classes of Sec. 101.

5. Claims 1, 3 and 5-22 are rejected under 35 U.S.C. 101 as not falling within one of the four statutory categories of invention. While the claims recite a series of steps or acts to be performed, a statutory "process" under 35 U.S.C. 101 must (1) be tied to another statutory category (such as a particular apparatus), or (2) transform underlying subject matter (such as an article or material) to a different state or thing (Reference the May 15, 2008 memorandum issued by Deputy Commissioner for Patent Examining Policy, John J. Love, titled "Clarification of 'Processes' under 35 U.S.C. 101"). The instant claims neither transform underlying subject matter nor positively tie to another statutory category that accomplishes the claimed method steps, and therefore do not qualify as a statutory process.

6. Claims 25 and 26 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter as follows. **Claims 25 and 26 define a computer program product comprising program code instructions recorded carrier usable in a computer, comprising computer-readable programming means** embodying functional descriptive material. However, the claims do not define a computer-readable medium or computer-readable memory (the term **"carrier usable in a computer"** is not a computer-readable medium it could be a carrier wave) and are thus non-statutory for that reason (i.e., "When functional

descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized" – Guidelines Annex IV). The scope of the presently claimed invention encompasses products that are not necessarily computer readable, and thus NOT able to impart any functionality of the recited program. The examiner suggests amending the claims to embody the program on "computer-readable medium" or equivalent; assuming the specification does NOT define the computer readable medium as a "signal", "carrier wave", or "transmission medium" which are deemed non-statutory (refer to "note" below). Any amendment to the claim should be commensurate with its corresponding disclosure.

Note:

"A transitory, propagating signal … is not a "process, machine, manufacture, or composition of matter." Those four categories define the explicit scope and reach of subject matter patentable under 35 U.S.C. § 101; thus, such a signal cannot be patentable subject matter." (*In re Petrus A.C.M. Nuijten;* Fed Cir, 2006-1371, 9/20/2007).

Should the full scope of the claim as properly read in light of the disclosure encompass non-statutory subject matter such as a "signal", the claim as a whole would be non-statutory. In the case where the specification defines the computer readable medium or memory as statutory tangible products such as a hard drive, ROM, RAM, etc, as well as a non-statutory entity such as a "signal", "carrier wave", or "transmission medium", the examiner suggests amending the claim to ***include*** the disclosed tangible computer readable media, while at the same time ***excluding*** the intangible media such as signals, carrier waves, etc.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 1and 13 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

As to claim 1:

i. It is unclear the term “at least one detail image” in the preamble of the claim, because this term contradicts with the term “at least two detail images" defined in the main section of the claim. It appears to be more accurate to define two detail images in the preamble as well, because at least two detail images are required in order to merge their coefficients.

ii. It is also unclear the term “unique tree structure”, because it is not clearly specified the data that form the tree structure. Which data is forming the unique tree structure? The data consisting of the wavelet coefficients or the salience values of the wavelet coefficients.

As to claim 13, it is unclear the subscript k in the term α_k. It appears to be more accurate to replace k with j.

Claim Rejections – 35 USC § 103

The following is a quotation of the 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained thought the invention is not identically disclosed or described as set forth in section 102 of this title, if the difference between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 1, 3, 5,7-11 and 14-23 are rejected under 35 U.S.C 103(a) as being unpatentable over Tian et al. “Image retrieval using wavelet-based salient points”, Journal of Electronic Imaging 10(4), 835–849 (October 2001), in view of Zeng et al., US patent No. 6236757.

As to claim 1, Tian teaches A method for the detection of points of interest in a source digital image (**Abstract: A method of image retrieval using salient point detector**), said method implementing a wavelet transformation associating a sub-sampled image (**Abstract, the detector is based on wavelet transform to detect global variations as well as local ones by decomposing the image)**, called a scale image **(page 3 section 3.1 2nd paragraph, a wavelet is an oscillating and attenuating function with zero integral. The image *f* is analyzed at scale (or resolution) 2^j where $j \in Z$ and $j \leq -1$**) with a source image (**Fig. 1(a)**), and wavelet coefficients corresponding to at least one detail image, for at least one level of decomposition (**page 3 section 3.1 2nd paragraph, the wavelet detail image $W_{2^j}(f)$ is obtained as the convolution of the image with the wavelet function dilated at different scales. And the set of wavelet detail image $W_{2^j}f(n)$ coefficients are given by equation 1**), a point of interest (**page 3 section 3.1 1st paragraph, a wavelet based-salient points**) being a point associated with a region of the image showing high frequencies (**page 3**

section 3.1 1st, extract salient points from any part of the image where "something" happens in the image at any resolution. The extraction can be carried out by looking at high wavelet coefficients), wherein the method comprises the following steps:

the application of said wavelet transformations to said source image(**page 4. section 3.2 1st paragraph, perform two dimensions image wavelet transformation to source image**), during which, for each decomposition level (**page 4. section 3.2 2nd paragraph, the two dimensions wavelet transformation leads to three different wavelet functions**), there are determined at least two detail images corresponding respectively to at least two directions predetermined by said wavelet transformation (**page 4. section 3.2 2nd paragraph, three different wavelet functions related to three different spatial orientation(horizontal, vertical and diagonal). Thus, the 2D wavelet transformation provides three detail images corresponding to the three different spatial orientations);**

the construction of a unique tree structure from the wavelet coefficients of each of said detail images (**page 3 section 3.1 describes the detection of salient points in a digital image, based on the conversion of the image into wavelets. The conversion provides, for each level of break-down, three detail images corresponding to three predetermined directions (page 4 section 3.2) , and therefore provides a wavelet coefficient tree**);

the selection of at least one point of interest by analysis of said tree structure (**page 5 section 3.3 , The analysis of the tree structure comprises the recursive tracking of the maximum coefficients through the tree structure and adding same to a salience value for all the coefficients and pixels of the image. Said salience values are used, finally, to determine the salient points via a thresholding step**)

` It is however noted that Tian does not specifically teaches “the merging of the coefficients of said detail images so as not to give preference to any direction of said source image”

On the other hand a method for wavelet transform coding of a segmented digital image of Zeng teaches the merging of the coefficients of said detail images so as not to give preference to any direction of said source image (**Fig. 1 element 34, col.2 lines 55-62, the composite wavelet coefficient mapper gathers the wavelet coefficients produced by each wavelet filter into a composite coefficient image, arranging them as if they were produced from a single wavelet transform. Finally, the transform coder codes the composite coefficient image).**

It would have been obvious to one the ordinary skill in the art at the time of applicant’s invention was made to incorporate the Joint coding method for images and videos with multiple arbitrarily shaped segments or objects of Zeng into the method of Image retrieval using wavelet-based salient points of Tian, because both Zeng and Tain are directed digital image encoding based on to the Haar wavelet transform (Tian: page Fig. 2, Zeng: col. 7 lines 23-26).

One of ordinary skill in the art at the time the applicant’s invention was made to incorporate the Joint coder (Fig. 1 element 34) of Zeng into wavelet based salient point detection of Tian, because that would have allowed user of Tian to merge wavelet coefficients of two or more images using the composite wavelet coefficient mapper. More specifically, the composite wavelet coefficient mapper gathers the wavelet coefficients produced by each wavelet filter into a composite coefficient image, arranging them as if they were produced from a single wavelet transform (**col.2 lines 57-60**).

As to claim 3, Tian teaches the detail images comprise:

- a detail image representing the vertical high frequencies;

- a detail image representing the horizontal high frequencies; and

- a detail image representing the diagonal high frequencies**(page 4 section 3.2, the extension of the wavelet model to two dimensions leads to three different wavelet functions ψ1, ψ2, and ψ3, related to three different spatial orientations horizontal, diagonal, and vertical. The horizontal wavelet function ψ1, the diagonal wavelet function ψ2, and vertical wavelet function ψ3 each contains the high frequencies of the horizontal, diagonal and vertical salient points respectively).**

As to claim 5, Zeng teaches step for the construction of a tree structure relies on a zerotree type of approach **(FIG. 7, which shows the quadtree-segmented image after leaf node merging, and its corresponding quadtree structure**. The zero tree structure is **equivalent to the quadtree structure).**

As to claim 7, Tian teaches said selection step implements a step **(page 5 section 3.3)** for the construction of at least one salience map**(Fig. 4, Fig.6 f),** assigning said wavelet coefficients **(page 5 section 3.3 step 2: for each wavelet coefficient, find the maximum child coefficient to construct a salient point)** a salience value representing its interest

As to claim 8, Tian teaches said a salience map is built for each of said resolution levels (**page 5 section 3.3 step 3, for the salient points extraction track the wavelet coefficients recursively in finer resolutions. The Finer resolution level is ½.**)

As to claim 9, Tian teaches for each of said salience maps **(Fig. 4),** for each salience value (**Fig. 4 Salient point of the original image**);

However it is noted that Tian does not teach “a merging is performed of the pieces of information associated with the three wavelet coefficients corresponding to the three detail images so as not to give preference to any direction in the image” although Tian suggest splitting information associated with the three wavelet coefficients related to the extension of the wavelet model in to two dimensions. The extension generate three different wavelet function related to three different spatial orientations.

On the other hand Zeng teaches a merging is performed of the pieces of information associated with the three wavelet coefficients corresponding to the three detail images so as not to give preference to any direction in the image (**Fig. 1 element 34, col.2 lines 55-62, the composite wavelet coefficient mapper gathers the wavelet coefficients produced by each wavelet filter into a composite coefficient image, arranging them as if they were produced from a single wavelet transform. Finally, the transform coder codes the composite coefficient image).**

As to claim 10, Tian teaches a salience value of a given wavelet coefficient**(page 3 equation 2**) having a given level of resolution**(page 3 section 3.1 second paragraph, the wavelet coefficient depends on the level of resolution or scale)** takes account of the salience value or values of the descending order wavelet coefficients in said tree structure of said given wavelet coefficient(**page 4 section 3.3 , the analysis of the tree structure comprises the recursive tracking of the maximum coefficients through the tree structure and adding same to a salience value for all the coefficients and pixels of the image**).

As to claim 11, Tian teaches a salience value is a linear relationship of the associated wavelet coefficients **(page 3 section 3.1 3rd paragraph equation 2, saliency value as the sum of the absolute value of the wavelet coefficients in the track. Thus, for positive value wavelet coefficients the salient value and corresponding wavelet coefficients has linear relationship).**

As to claim 14, Tian teaches said selection step comprises a step for building a tree structure of said salience values (**page 3 section 3.1, describes the detection of salient points in a digital image, based on the conversion of the image into wavelets**. **The conversion provides, for each level of break-down, three detail images corresponding to three predetermined directions (page 4 section 3.2) , and therefore provides a wavelet coefficient tree).**

As to claim 15, Zeng teaches step for the construction of a tree structure of said salience values relies on a zerotree type of approach **(FIG. 7, which shows the same quadtree-segmented image after leaf node merging, and its corresponding quadtree structure**. The zero tree structure is **equivalent to the quadtree structure).**

As to claim 16, Tian teaches said selection step advantageously comprises the steps of:

- descending-order sorting of the salience values of the salience map corresponding to the minimum resolution **(page3 section 3.1 3rd paragraph, in the recursively salient point extraction algorithm each wavelet coefficient is computed with 2^{-j} p signal points. It represents their variation at the scale 2^{j}. The most salient subset is the**

one with the highest wavelet coefficient at the scale 2^{j+1} **that is the maximum in absolute value of salient points. Thus, the recursively salient point extraction algorithm generates a descending-order sorting based on the level of resolution**); and

- selection of the branch having the highest salience value (**page3 section 3.1 3rd paragraph, in the salient point extraction algorithm this maximum value is considered, and look at his highest child**) for each of the trees thus sorted.

As to claim 17, Tian teaches said step for the selection of the branch having the highest salience value implements a corresponding scan of the tree starting from its root and a selection (**page 5 section 3.3, the analysis of the tree structure comprises the recursive tracking of the maximum coefficients through the tree structure and adding same to a salience value for all the coefficients and pixels of the image. Said salience values are used, finally, to determine the salient points via a thresholding step)**, at each level of the tree (**page 3 section 3.1, describes the detection of salient points in a digital image, based on the conversion of the image into wavelets. The conversion provides, for each level of break-down, three detail images corresponding to three predetermined directions (page 4 section 3.2))**, of the offspring node having the highest salience value (**Thus, offspring node corresponds to** the node that contains the **maximum coefficients through the tree structure,** highest salience value **corresponds to value of the maximum coefficients through the tree structure).**

As to claim 18, Tian teaches said wavelet transformation implements the Haar base (**page 3 section 3.1 2nd paragraph equation 1, page 6 Fig. 6(f)).**

As to claim 19, Tian teaches a minimum level of resolution 2^{-4} **(page 3 section 3.1 2nd paragraph**, **A wavelet is an oscillating and attenuating function with zero integral, and the image f are analyzed at resolutions 2^{-J} where $J \in Z$ and $J \leq -1$. Thus, selecting j=4 is just a numerical implementation choice).**

As to claim 20, Tian teaches a step for the computation of an image signature from a predetermined number of points of interest of said image (**page 8 section 4.4 2nd paragraph, a feature extraction considers the pixels in a small neighborhood around each salient point that form the image signature. The step of feature extraction includes 3X3 neighborhood pixels for color features extraction and 9X9 neighborhood pixels for texture features extraction).**

As to claim 21, Tian teaches said signature is used especially to index images by their content (**Abstract, the use of interest points in content-based image retrieval allow image index to represent local properties of the image**).

As to claim 22, Tian teaches least one of the fields comprising selected from the group consisting of

-image watermarking;

- image indexing (**Abstract)**; and

- the detection of faces in an image (**Fig.1**, **page 6 2nd paragraph**, **Wavelet-based salient points are extracted in the dress as well as other parts of the image (face, background)).**

As to claim 23, Tian teaches A device for the detection of points of interest in a source digital image (**Fig. 2, A camera**), implementing a wavelet transformation associating a sub-sampled image (**page 6 2nd paragraph**, **Wavelet-based salient points are extracted in the dress as well as other parts of the image (face, background)**), called a scale image, with a source image **(page 6 Fig. 6)** and wavelet coefficients corresponding to at least one detail image (**page 6 2nd paragraph salient points are extracted in the dress as well as well as other parts of the image based on wavelet coefficients**), for at least one level of decomposition(**page 6 Fig. 6, the Figures 6 show wavelet based decomposition at different resolution level**).

a point of interest being a point associated with a region of the image showing high frequencies **(page 3 section 3.1 1st , extract salient points from any part of the image where "something" happens in the image at any resolution. The extraction can be carried out by looking at high wavelet coefficients),**

wherein the device comprises:

means for the application of said wavelet transformations to said source image (**page 8 section 4.4 1st paragraph, a fixed number of salient points for each image in the database are extracted using Haar wavelet transform for each image in data base**) during which, for each decomposition level **(page 6 Fig.6, Figure 6 shows image decomposition at different level using Haar wavelet transform**), there are determined at least two detail images(**page Fig. 6)** corresponding respectively to at least two directions predetermined by said wavelet transformation **(page 3 section 3.1, describes the detection of salient points in a digital image, based on the conversion of the image into wavelets**. **The conversion provides, for each level of break-down, three detail images corresponding to three predetermined directions);**

means for the construction of a unique tree structure(**page 3 section 3.1, Haar wavelet transform**) from the wavelet coefficients of each of said detail images(**page 3 section 3.1, describes the detection of salient points in a digital image, based on the conversion of the image into wavelets using Haar wavelet transform. The conversion provides, for each level of break-down, three detail images corresponding to three predetermined directions (page 4 section 3.2) , and therefore provides a wavelet coefficient tree)**;

and means for the selection (**page 5 section 3.3 via a thresholding step**) of at least one point of interest by analysis of said tree structure (**page 5 section 3.3, the analysis of the tree structure comprises the recursive tracking of the maximum coefficients through the tree structure and adding same to a salience value for all the coefficients and pixels of the image. Said salience values are used, finally, to determine the salient points via a thresholding step);**

It is however noted that Tian does not specifically teaches "means for the merging of the coefficients of said detail images so as not to give preference to any direction of said source image";

On the other hand a method for wavelet transform coding of a segmented digital image of Zeng teaches means for the merging of the coefficients of said detail images(**Fig. 1 element 34: Joint Coder**) so as not to give preference to any direction of said source image (**Fig. 1 element 34, col.2 lines 55-62, the composite wavelet coefficient mapper gathers the wavelet coefficients produced by each wavelet filter into a composite coefficient image, arranging them as if they were produced from a single wavelet transform. Finally, the transform coder codes the composite coefficient image).**

9. *Claims 6 is rejected under 35 U.S.C 103(a) as being unpatentable over Tian et al., "Image retrieval using wavelet-based salient points", Journal of Electronic Imaging 10(4), 835–849 (October 2001), in view of Zeng et al., US patent No. 6236757, further in view of Lynch et al., US Patent No. 6381280.*

As to claim 6, it is however noted that both Tian and Zeng do not specifically teach each point of the scale image having minimum resolution is the root of a tree with which is associated an offspring node respectively formed with each of the wavelet coefficients of each of said detail image or images localized at the same position, and then recursively, four offspring nodes are associated with each offspring node of a given level of resolution these four associated offspring nodes being formed by the wavelet coefficients of the detail image that is of a same type and at the previous resolution level, associated with the corresponding region of the source image. Although Tian suggest a recursive procedure of building tree structure based on the wavelet coefficients (page 5 section 3.3), while Zeng suggest a wavelet based quadtree structure.

On the other hand the motion wavelet transform zero tree codec for image and video compression of Lynch teaches each point of the scale image(**col.13 lines 40-43, Wavelet transform and scaling are performed together during Zerotree coding of an image**) having minimum resolution is the root of a tree (**Fig. 9 , the root of the tree at level 1 has minimum resolution**) with which is associated an offspring node (**Fig. 9 element 802, element 802 corresponds to the offspring node**) respectively formed with each of the wavelet coefficients of each of said detail image or images localized at the same position **(FIG. 9, col. 8 lines 15-20, Fig. 9 illustrates wavelet coefficient**

pyramid 600 showing how individual wavelet coefficients from various of the sub-bands), and then recursively four offspring nodes(**Fig. 9 element 810-816)** are associated with each offspring node **(Fig. 9 element 804)** of a given level of resolution **(Fig. 9 the four bands (i.e., HH, HL, LH, and LL))** these four associated offspring nodes(**Fig. 9 element 810-816)** being formed by the wavelet coefficients of the detail image**(FIG. 10 illustrates a zero tree formed from wavelet coefficients in the transform pyramid)** that is of a same type and at the previous resolution level (**Level LL and LH**), associated with the corresponding region of the source image.

It would have been obvious to one the ordinary skill in the art at the time of applicant's invention was made to incorporate the single chip motion wavelet transform zero tree codec for image and video compression of Lynch into the combined method of Tian and Zeng, because all Tian, Zeng and Lynch disclosed techniques of designing a tree structure based on Haar wavelet transform (Tian: page 5 section 3.3, Zeng: Abstract, Lynch: Abstract, col.12 lines 19-21).

It would have been obvious to one the ordinary skill in the art at the time of applicant's invention was made to incorporate wavelet based zerotree codec of Lynch into the combined method of Tian and Zeng, because that would allow user of Tian to achieves high compression ratios. Further Lynch zero tree coding would allow user of Tian to achieves better peak signal to noise ratios (PSNR) for a variety of different images and video.

10. Claims 24-26 are rejected under 35 U.S.C 103(a) as being unpatentable over Tian et al., "Image retrieval using wavelet-based salient points", Journal of Electronic Imaging 10(4), 835–849 (October 2001), in view of Zeng et al., US patent No. 6236757, further in view of Mitchel "An Efficient Image Coding Implementation Using the Quadtree Algorithm", 1994 IEEE, PP 453-456.

As to claim 24, Tian teaches the means for the application **(page 10, Fig. 10 a computer program that show a simulation of query image and its salient points in the computer screen)**, means for the construction (**page 10, Fig. 10 , Figure 10 the simulation shows the query image and constriction of its salient points)** and means for the selection (**page 10, Fig. 10 the simulation shows means for selection a quarry image with different salient points**) comprises program code instructions (**Thus, the simulation is carried out using a predetermined computer program code**).

It is however noted that both Tian and Zeng do not teach "means for the merging comprises program code instructions" although Zeng suggest computer based wavelet conversion where the wavelet transform images are commonly coded for transmission **(col.6 lines 53-54)**

On the other hand the Efficient Image Coding Implementation Using the Quadtree of Mitchell teaches means for the merging comprises program code instructions**(page 454 left col. 2nd paragraph, the Quadtree algorithm executes the coding of the digital image data. The sequence of computer program steps that carry out the Quadtree algorithm includes coding, storage and decoding)**

It would have been obvious to one the ordinary skill in the art at the time of applicant's invention was made to incorporate *the efficient image coding implementation using the Quadtree algorithm* of *Mitchel* into the combined method of Tian and Zeng, because that would allowed user of Tian to achieve optimal coding that includes great reduction in memory storage, a non-destructive means of coding images and high resolution reconstructed images *(Mitchel page 454 section 5 1st paragraph).*

As to claim 25, Tian teaches computer program product (**page 10 Fig. 10 Fig 10 shows a computer simulation that illustrates query images and their salient points**) comprising program code instructions recorded on a carrier usable in a computer(**Thus, the simulation carried out using a predetermined computer program code**), comprising computer-readable programming means (**Fig. 10, the computer simulation shown in Figure 10)** for the implementation of a wavelet transformation (**Fig. 10**, **Haar based wavelet transformation**) associating a sub-sampled image(**Fig. 10**), called a scale image **(page 3 section 3.1 2nd paragraph**), with a source image, and wavelet coefficients corresponding to at least one detail image, for at least one level of decomposition(**page 3 section 3.1 2nd paragraph, the wavelet detail image $W_{2^j}(f)$ is obtained as the convolution of the image with the wavelet function dilated at different scales(levels). And the set of wavelet detail image $W_{2^j} f(n)$ coefficients are given by equation 1**),
a point of interest(**page 3 section 3.1 1st paragraph, a wavelet based-salient points** being a point associated with a region of the image showing high frequencies(**page 3 section 3.1 1st, extract salient points from any part of the image where "something" happens in the image at any resolution. The extraction can be carried out by looking at high wavelet coefficients),**

wherein the computer program product comprises:

computer-readable programming means(**Fig. 10, a computer program that show the simulation query images(see Fig. 10)**) to carry out the application of said wavelet transformations transformation to said source image(**Fig. 10 shows that the simulation is carried out based on Haar wavelet transformation**), during which, for each decomposition level, there are determined at least two detail images corresponding respectively to at least two directions predetermined by said wavelet transformation(**page 4. section 3.2 2nd paragraph, three different wavelet functions related to three different spatial orientation(horizontal, vertical and diagonal). Thus, the 2D wavelet transformation provides three detail images corresponding to the three different spatial orientations).**

computer-readable programming mean the construction of a unique tree structure from the wavelet coefficients of each of said detail images (**page 3 section 3.1 describes the detection of salient points in a digital image, based on the conversion of the image into wavelets. The conversion provides, for each level of break-down, three detail images corresponding to three predetermined directions (page 4 section 3.2) , and therefore provides a wavelet coefficient tree**)

computer-readable programming means to carry out the selection of at least one point of interest by analysis of said tree structure (**page 5 section 3.3 , the analysis of the tree structure comprises the recursive tracking of the maximum coefficients through the tree structure and adding same to a salience value for all the coefficients and pixels of the image. Said salience values are used, finally, to determine the salient points via a thresholding step**)

` It is however noted that both Tian and Zeng do not specifically teach "computer-readable programming means to carry out the merging of the coefficients of said detail images so as not to give preference to any direction of said source image"

On the other hand the Efficient Image Coding Implementation Using the Quadtree of Mitchell teaches computer-readable programming means for the merging comprises program code instructions **(page 454 left col. 2nd paragraph, the Quadtree algorithm executes the coding of the digital image data. The sequence of computer program steps that carry out the Quadtree algorithm includes coding, storage and decoding).**

As to claim 26, Tian teaches Computer-usable digital data carrier(**Fig. 10, A computer that carry out the query image simulation**) comprising program code instructions of a computer program **(Fig. 10, the salient points of the query image is obtained using a program code that carry out the Haar based wavelet transformation algorithm).**

Allowable Subject Matter

11. Claims 12 and 13 are objected to as being upon rejected base claims, but would be allowable if rewritten in independent forms including all the limitations of the base claims and intervening claims.

The following is an examiner's statement of reason of allowance: The closest prior art, Tian et al. and Zeng et al., fail to anticipate or render the following limitations obvious:

the salience value of a given wavelet coefficient is computed from the following equations

$$\begin{cases} S_{2^{-1}}(x,y) = \alpha_{-1}\left(\frac{1}{3}\sum_{u=1}^{3}\frac{D_{2^{-1}}^{u}(x,y)}{Max(D_{2^{-1}}^{u})}\right) \\ S_{2^{j}}(x,y) = \frac{1}{2}\left(\alpha_{j}\left(\frac{1}{3}\sum_{u=1}^{3}\frac{D_{2^{j}}^{u}(x,y)}{Max(D_{2^{j}}^{u})}\right) + \frac{1}{4}\sum_{u=0}^{1}\sum_{v=0}^{1}S_{2^{j+1}}(2x+u,2y+v)\right) \end{cases}$$

wherein the parameter α_k =1/r is equal to -1/r for all the values of k.

Conclusion

Any inquiry concerning this communication or earlier communication from the examiner should be directed to Mekonen Bekele whose telephone number is 571-270-3915. The examiner can normally be reached on Monday -Friday from 8:00AM to 5:50 PM Eastern Time.

If attempt to reach the examiner by telephone are unsuccessful, the examiner's supervisor WU JINGGE can be reached on (571) 272-7429. The fax phone number for the organization where the application or proceeding is assigned is 571-237-8300.

Information regarding the status of an application may be obtained from the patent Application Information Retrieval (PAIR) system. Status information for published application may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished application is available through Privet PAIR only.

For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have question on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866.217-919 (tool-free)

/MEKONEN BEKELE/
Examiner, Art Unit 2624
October 6, 2008

/Brian Q Le/

Primary Examiner, Art Unit 2624